

# When North America Burned

BY CARL ZIMMER

*The impact that may have killed the dinosaurs also triggered the most terrible fire in the planet's history, setting most of North America ablaze within minutes.*

---

## SIXTY-FIVE MILLION YEARS AGO,

at the end of the Cretaceous Period, a 10-mile-wide comet or asteroid dropped out of the sky and plowed out a 120-mile-wide crater in the Caribbean near Mexico's Yucatan Peninsula. The impact, many researchers believe, was at least partly responsible for the fifth biggest extinction of all time, with numerous species of plants, marine animals, and, most famously, dinosaurs vanishing. But finding the links between the crater, known as Chicxulub, and the pattern of extinctions has been tricky. Recently, however, two Rhode Island researchers have found a clue--the angle of the impact--that could explain a lot about the extinctions, particularly why North America suffered more than the rest of the world. The Chicxulub fist of fury, say the researchers, came streaking toward the northwest over the Atlantic at an angle of 20 to 30 degrees, creating an enormous, searing vapor cloud that within minutes incinerated large parts of the western United States.

Peter Schultz, a planetary geoscientist at Brown, applied to Chicxulub his years of experience studying craters on other worlds. Analyzing the surfaces of our moon and the planets Mercury and Venus, he figured out ways to determine the angles at which impacts occurred from the craters they left behind. If an asteroid falls straight down on its target, he found, it leaves a symmetrical ring. If it comes in more obliquely, however, the bottom of the asteroid rams into the ground while the top, its tremendous momentum unchecked, shears off, spraying debris forward. An egg-shaped crater forms, with the long, narrow end downrange. "It was one of

these deals where you hit yourself on the head," says Schultz. "I started noticing that repeatedly there was a nice relationship between the asymmetry of the crater and the angle of impact. I saw it on the moon, I saw it on Mercury, and I saw it on Venus."

Since researchers first realized in 1991 that a crater lay hidden a mile underground in the Yucatan, they have studied the patterns of magnetism and gravity of the area to map Chicxulub. Schultz's own recent study of the crater revealed that it had the telltale egg shape and a number of other signs of an oblique collision pointing toward the northwest.

If the Chicxulub impact had been perpendicular to the ground, much of its energy would have been absorbed by Earth, with most of the debris launched straight up into space. But the oblique trajectory of the impactor must have produced a very different aftermath, says Schultz. The impact shaved off a vast acreage of surface rock and launched a huge low cloud of hot vapor that hugged the ground as it continued along the impactor's path. Within three minutes the cloud overran much of the western United States. Only after this local cataclysm did the impact's debris begin to spread more evenly around the world.

Schultz's scenario makes sense to paleobiologist Steven D'Hondt of the University of Rhode Island. Such a regional apocalypse, says D'Hondt, explains some puzzles of the fossil record. The extinction rate of plants in North America, for example, was at least triple that found in the rest of the world. The fossil record in North America also shows an odd abundance of ferns after the extinction event. D'Hondt and Schultz point out that even 2,000 miles northwest of the Yucatan, the heat of the cloud would have ignited plants. After the conflagration, opportunistic ferns would have invaded and dominated for a time.

The theory may also explain another anomaly: studies of late Cretaceous fossils in Montana suggest that a species that lived on land was nine times more likely to go extinct than a freshwater resident. That seems logical if a scorching vapor cloud raced across North America at six miles a second: a turtle submerged in a pond might survive, while a Tyrannosaurus rex stalking in a glade would fry.

If Schultz and D'Hondt are right, further study should continue to show that extinction patterns in North America were unique, providing mute testimony to a time when the continent burned.

## WHEN NORTH AMERICA BURNED

9<sup>th</sup> grade Earth Science, CP

Wendy Simpson

1. A major idea of this selection is that

- A. Mercury and Venus experience more asteroid impacts than Earth.
- B. Much of North America was set ablaze by an asteroid impact.
- C. Ferns dominated North American plants in the Cretaceous period.
- D. Peter Schultz discovered a 120-mile wide crater in the Caribbean.

2. According to this passage,

- A. The oblique asteroid impact explains extinction patterns in North America.
- B. Only species that lived on land went extinct.
- C. Fossil evidence of extinct dinosaurs was found in the crater.
- D. The moon, Mercury, and Venus had similar extinction events.

3. The word oblique located in paragraph 4 means

- A. rounded
- B. rapid
- C. destructive
- D. inclined

4. After examining the prefix/suffix, you can infer that the meaning of cataclysm is

- A. a destructive event
- B. a fire
- C. an extinction
- D. an impact



5. The word anomalous comes from the Greek word *anomalos*, meaning uneven. The word anomaly means

- A. an unknown object
- B. something different from what is expected
- C. nameless
- D. a crooked path

6. Think about the main idea of paragraph five. Then choose the detail that was used to support the main idea.

- A. The extinction rate of plants in North America was triple that of the rest of the world.
- B. The heat of the cloud ignited plants.
- C. There are no ferns in the North American fossil record.
- D. There are many puzzles in the fossil record.

7. Which one is not a reason or cause for North American extinctions in the Cretaceous period?

- A. The impact of an asteroid or comet.
- B. Freshwater species could survive intense heat.
- C. A hot cloud of vapor continued along the impactor's path.
- D. Plants were ignited by the hot fire.

8. The author wrote this article to

- A. Entertain
- B. Describe
- C. Debate
- D. Inform

9. Which keywords would be the BEST for finding out more about this topic?

- A. geoscience, paleobiology, research
- B. Tyrannosaurus, ferns, turtles
- C. North America, crater, geology
- D. Cretaceous, extinction, Chicxulub

10. Another appropriate title for this piece would be \_\_\_\_\_

- A. Cretaceous Impact Targets North America
- B. Land Animals Killed by Cretaceous Comet
- C. Impact Causes Largest Extinction of All Time
- D. Impact Crater Discovered in the Yucatan

11. After reading this article, what do you think would happen if the comet or asteroid had impacted perpendicular to the earth?
- A. The effects would have been spread more evenly around the earth.
  - B. There would have been no extinctions.
  - C. Only the impact area would experience damage.
  - D. There would be no evidence preserved of the impact.

12. Which of the following resources would be most likely to give you the most information about life in the Cretaceous?

- A. a specialized atlas of North America
- B. a general encyclopedia
- C. a geology textbook
- D. a paleontology book

40 B

9<sup>th</sup> grade CP Earth Science

Imagine that you are a freshwater animal in North America that experienced and survived the comet/asteroid impact at the end of the Cretaceous Period. Describe your experiences, how you survived, and what life was like in the aftermath. Use details and information from the article in your answer.

- Write as though you experienced the Cretaceous impact event.
- Decide what the event would have been like, and what North America would be like afterwards.
- Support your answer with details from the selection.
- Write neatly and clearly.
- Use only the space provided.

[illegible]